

## NOTES ON AUSTRALIAN MUSCOIDEA, V.

## Calliphoridae.

BY G. H. HARDY.

(Read before the Royal Society of Queensland, 27th November, 1939.)

A key to subfamilies of the Calliphoridae was given in the first part of this series of papers (Hardy 1934), and the genera known to me under the Rhiniinae, Chrysomyiinae, and Calliphorinae are to be recognised by the characters given in the following key:—

1. Without forwardly directed fronto-orbital bristles on the female. Sternopleurals 1:1. Palpi conspicuously flattened. Only a few thoracic bristles present. The ridge of the squama bare . . . . . 2
  - With one pair of forwardly directed fronto-orbital bristles on female. Arista long plumose. Thoracic bristles well developed . . . . . 4
  - With a series of more or less forwardly directed fronto-orbital bristles on female, parallel with those bordering the interfrontalia. Sternopleurals 1:1. Palpi conspicuously flattened. Cheeks hairy, at least microscopical. Arista pubescent or bare. Thoracic bristles well developed. Squama and ridge bare . . . . . *Metalca*
2. Squama bare above. Arista more or less sparsely plumose or pubescent . . . . . 3
  - Squama very hairy above. Arista densely pubescent . . . . . *Chrysomyia*
3. A metallic green species on which the wings, when at rest, bend downwards from the basal cells, thus, in life, lying along the depressed abdomen they give the superficial appearance of a beetle. The fifth radial and first median veins meet before the wing margin . . . . . *Chlororhina*
  - Otherwise coloured species with normal wings, and if the fifth radial and first median veins meet, then the abdomen is brown . . . . . *Rhinia*
4. Fifth sternite of male not cleft or emarginated in any way at the apex, and with a well developed subapical spine. Otherwise liable to be confused with *Pollenia* . . . . . *Aphyssura n.gen.*
  - Fifth sternite of male cleft along the median line, the two sides contiguous, or else widely V-shaped . . . . . 5
5. Squama usually hairy on the upper side, though often inconspicuously so or the hairs are absent; in these two latter cases the species is small and with a metallic blue-green abdomen. Other characters also very variable . . . . . *Calliphora*
  - Squama always bare. If very small species, then the abdomen is not blue-green . . . . . 6
6. Sternopleural bristles arranged 2:1 . . . . . 7
  - Sternopleural bristles arranged 1:1. Area of thorax below squama bare . . . . . 8
7. Area of thorax immediately below squama with hairs . . . . . *Lucilia*
  - Area of thorax immediately below squama entirely bare . . . . . *Euphumosia*
8. Cheeks hairy and thoracic bristles long . . . . . *Pollenia*
  - Cheeks bare and thoracic bristles unusually short . . . . . *Paratrichlea*

This key omits *Acanthomyza*, which is very poorly described, and I do not know if I have it correctly identified. *Dezopollenia* Bezzi 1927, p. 231, is not in any collection I have seen.

## Subfamily RHINIINAE.

Key to genera of the *Rhiniinae*.

1. Facial carina well developed, but with a rounded dorsal surface, showing its tendency towards reduction. Arista with conspicuous cilia above. Without marked bristles on the dorsum of thorax and abdomen. Fifth radial cell open or closed. Closely pitted above with hair-pits .. .. . *Rhinia*
- Facial carina very much reduced. Arista only pubescent. Hair-pits on body above reduced to hair-spots .. 2
2. Fifth radial and first median veins meeting before wing border, and the whole wing tends to fold at the apex of the basal cells. Without marked bristles, but with coarse hair-spots. Entirely metallic green, with a large blackish disc on the depressed abdomen .. *Chlororhinia*
- Venation normal. Thorax with complete bristles and reduced hair-pots .. .. . *Metallea*

Genus *Rhinia* Desvoidy.Key to species of *Rhinia*.

1. Fifth radial and first median veins meeting before wing margin. Abdomen mainly brown, but slightly marked *xanthogaster* Wied.
- Fifth radial and first median veins not meeting. Abdomen conspicuously marked with bands .. .. . 2
2. Species of small average size, more bluish in colour, eyes almost contiguous on the male, and the parafrons of the female with coarse hair-pits .. .. . *subapicalis* Macq.
- Species of larger average size, more coppery coloured, eyes separated on the male by the width of one ocellus, and the parafrons of the female with abundance of very small hair-pits .. .. . *cribellata* Bezzi.

I have not seen *Rhinia pallida* Malloch 1927, which is said to have scutellum and legs testaceous and is from North Queensland. The other three have an involved synonymy which I believe to be interpreted correctly here.

*Rhinia xanthogaster* Wiedemann.

*Idia xanthogaster* Wiedemann 1830, 349.—Senior-White 1924, 113 (*Idielliopsis*).—Senior-White 1925, 93 (*Stomorhina*).—Bezzi 1927, 234 (*Stomorhina*).—Malloch 1927, 334 (*Stomatorhina*).—Malloch 1928, 612 (*Rhinia*).

*Idia australis* Walker 1849, 809.—Brauer and Bergenstamm 1893, 220.

Although this synonymy was given by Senior-White, Malloch gives Walker's name as a synonym of *subapicalis* Macq. The description agrees as here given, and Austen labelled a specimen with Walker's name. An allied form from Palm Island has entirely yellow legs and no markings on the abdomen. The present species is known from Queensland and New South Wales.

*Rhinia subapicalis* Macquart.

*Idia subapicalis* Macquart 1847, 82.—nec Malloch 1927.

*Euidiella discolor* Senior-White 1924, 112 (Australian specimens only)—Senior-White 1925, 93 (*Stomorhina*).—Bezzi 1927, 234 (Australian record only)—Malloch, 1927, 334 (*Stomatorhina*).

*Idia murina* Schiner 1868, 309.—Brauer and Bergenstamm, 1891, 418.

*Stomorphina subapicalis* Bergroth, 1894, 74.

*Stomatorhina quadrinotata* Malloch, 1927, 332.

Senior-White recorded some of this synonymy, and an attempt is made here to bring about a better understanding of the Australian element. Malloch brings in Bigot's name *quadrinotata* from Java, but does not show if this be conspecific as claimed. Moreover, the species as now standing might be a complex of two species, both of which have two rows of very coarse hairpits on the parafrons of the female. The eye marks of both forms have a green band at antennal level, with three more green bands above and five below; thus of the red field there are eight red bands and two blotches left in one case, in the other the eye marks are the same, except that both the upper and lower blotches are isolated by green from the eye margin and hence are reduced each to an elongated somewhat band-like spot. Except for a slight difference in the spacing of the bands, the eye-markings are similar on both sexes, and in all cases the uppermost and lowermost bands of red tend towards black. The species is common in New South Wales and Queensland.

*Rhinia cribellata* Bezzi.

*Stomorphina cribellata* Bezzi, 1927, 233.—Malloch, 1927, 334.

*Stomatorhina subapicalis* Malloch, 1927, 333.—nec Macquart.

This synonymy is new. The female has many more hair-pits on the parafrons than has *subapicalis* Macquart, and these are arranged usually in three distinct rows, and invariably so towards the anterior part. My note on the eye marks gives only eight green bands all separated from the posterior margin, so that the red bands between them join the two red blotches along that margin. As in the prior case the uppermost and lowermost bands of red tend towards blackish. The species occurs in Queensland, New South Wales, Victoria, and South Australia.

Genus *Chlororhina* Townsend, 1917.

*Chlororhina viridis* Townsend.

Townsend 1917, 191.—Malloch, 1926, 498; 1927, 332; 1929, 283.

An Australian specimen from the Johnston and Tiegs collection was identified by Aldrich as this species about 1921. It occurs in Queensland and New South Wales. The eye coloration shows black, but probably it is a blackish-red.

Genus *Metallea* v.d. Wulp.

v.d. Wulp, 1880, 174.—Malloch 1927, 329.

Both this genus and *Rhinia* contain species that hover in groups in the air, a feature that has allowed me to collect series that are undoubtedly conspecific. The species are very variable in coloration and can be identified by noting the fifth tergite of the female, the accessory plate on the male, and the fairly consistent hairing on the parafacials. The species of North Queensland and Western Australia have yet to be examined this way; the others are given below. In all cases the eyes in this genus are red.

Key to species of *Metallea*.

1. Fifth tergite on female membranous. Accessory plate on male enlarged and angulated. Face conspicuously with dark hairs and the hairs on the cheek may be dark also *incisuralis* Macquart.  
Fifth tergite of the female chitinous. Accessory plates on male normal, not angulated . . . . . 2
2. Accessory plates very broad. Face with some dark hairs . . . *nigribarbis* Aldrich.  
Accessory plates normal in width. Face without dark hairs . . . . . *cuprea* Walker.

*Metallea incisuralis* Macquart.*Rhynchomyia incisuralis* Macquart 1849, 241.*Metallea insularis* Malloch 1927, 330.

The synonymy is new. The brush of the fifth sternite on the male is dense from the base to near the apex, and the eyes are separated by the width of two ocelli whenever the frons is not contracted. In average size the species is larger than the other two, reaching 12 mm., but not infrequently it is quite small, 6 mm. or less. It occurs in New South Wales and Queensland.

*Metallea cuprea* Walker.*Musca cuprea* Walker 1856, 331.*Rhynchomyia gracilipalpis* Macquart, 1855, 109.—Brauer, 1899, 514.*Rhynchomyia trigina* Bigot, 1874, 242.—Brauer, 1899, 514.*Metallea illingworthi* Malloch, 1927, 330; 1929, 283.—nec. Aldrich.

The synonymy is new. Information from Sir Guy Marshall, in a letter dated 15th September, 1920, places Walker's species as being near *Rhynchomyia*, and the description leaves no doubt concerning the identity of the species. Both Walker and Macquart described it from South Australia, from which State specimens are before me. Malloch may have confused two or more species under the name *illingworthi*, but this is certainly one of them.

The brush on the fifth sternite thins out on the apical half, leaving the basal half densely supplied with bristles, and the accessory plates are less stout than those of others seen by me. The eyes of the male are separated by the width of one ocellus only. A series captured hovering together at Goondiwindi (Queensland) shows very wide colour variations and no differences in terminalia. It also occurs in New South Wales, being very abundant wherever found.

*Metallea nigribarbis* Aldrich.

Aldrich 1926, 10.—Malloch 1927, 331.

This apparently less-common species is not represented from Victoria in the material before me, but I have it from New South Wales and Queensland. A series hovering together shows wide colour variations and no differences in terminalia. Malloch records it from Eidsvold (Q.), and females may be included under Aldrich's *illingworthi* type series. The species is very like *cuprea* and may be readily mistaken for it. Victoria to Queensland.

*Metalea illingworthi* Aldrich.

*M. divisa* (Walker).—Senior-White, 1924, 114; 1925, 90.—Bezzi, 1927, 234.—Limited to Australian specimens so named by both authors.

*M. illingworthi* Aldrich, 1926, 7.—nec. Malloch 1927.

Both Senior-White and Bezzi record *M. divisa* Walker from Australia, and judging from the illustration of the terminalia given by the former, I have seen no specimens to conform to it. Aldrich believed he had the same Queensland species as those two authors, and mentions the "thick" brush of spines, uniform in length on the fifth sternite, these spines thinning out into long bristles towards the apex. Malloch, on the other hand, draws terminalia, reputed by him to be from the same species, with the brush practically obsolete. Aldrich states that the eyes are separated by the width of two ocelli, a character I have not seen on the *cuprea* series, so it is possible that Aldrich's species is not before me, and Malloch's interpretation doubtless is mainly based on *M. cuprea* Walker. North Queensland.

## Subfamily CHRYSOMYIINAE.

Australian species have been placed in several genera under this subfamily, but characters are not well established, standing as divisions no better than the similar divisions under *Calliphora*, nor is it clear where natural clefts occur worthy of generic consideration; therefore all forms in Australia are best relegated to the one genus. There are no satisfactory keys to species nor yet any comprehensive descriptions, and several species may yet prove to be complexes. The following notes give synonymy and biological data, the latter hitherto unpublished.

Genus *Chrysomyia* Desvoidy.

*Chrysomyia* Desvoidy 1830, 444.—Patton 1925, 405.—Bezzi 1927, 234.—Malloch 1927, 326.

*Pycnosoma* Brauer and Bergenstamm, 1894, 623.

*Psilostoma* Surcouf, 1914, 58.

*Microcalliphora* Townsend 1916, 618.—Aldrich 1925, 20.—Malloch 1927, 326.

*Achoetandrus* Bezzi, 1927, 235.

*Eucompso-myia* Malloch, 1927, 325.

All the terminalia I have seen in this genus have slender forceps fused together along the median line, and the accessory plates are also slender.

*Chrysomyia incisuralis* Macquart.

*Ochromyia incisuralis* Macquart 1849, 246.—Bigot 1877, 260. (*Somomyia*).—Surcouf 1914, 59. (*Psilostoma*).—Patton 1925, 409. (*Chrysomyia*).—Bezzi 1927, 235.—Malloch 1927, 327.

Before me there is only one pair definitely belonging to this species as it conforms to colour pattern on the type, illustrated by Surcouf. The specimens accessible to authors may not be conspecific, as they are darker and tend to differ in the distance between the eyes. This darker form occurs plentifully in rain-forest areas and a series from Mount Glorious (Q.) is before me. A specimen from Cairns is reported to have been

reared from cow-dung and was labelled "*Sternopterygia gigas*" by W. W. Froggatt, and thus recorded by Johnston and Bancroft (Mem. Qu. Mus. vii. 1920, 12).

*Hab.*—New South Wales and Queensland.

*Chrysomyia rufifacies* Macquart.

*Lucilia rufifacies* Macquart 1843, 146.—Macquart 1849, 243. (*Calliphora*).—Froggatt 1918, 663 (larva). (*Pycnosoma*).—Bezzi 1927, 235. (*Chrysomyia*).—Fuller 1932, 94 (larvae).

*Lucilia tasmanensis* Macquart 1849, 249.—Aubertin 1933, 431.

?*Somomyia saffraneana* Bigot 1877, 257.—Brauer 1899, 522.

?*Somomyia melanifera* Bigot 1877, 258.—Brauer 1899, 522.

*Chrysomyia albiceps* var. *putoria* Patton 1925, 409.

*Chrysomyia albiceps* Johnston and Hardy 1923, 33 (life cycle).—Malloch 1927, 327.—nec. Wiedemann.

*Chrysomyia albiceps* var. *rufifacies* Patton 1934, 223 (fig. 4c, posterior spiracle of larva).

The power attributed to this species, of burrowing into the living flesh, proves to be erroneous; larvæ have been used in Brisbane surgically in the treatment of osteomyelitis without inducing any trouble. The maggots are comparatively harmless and their predatory habits are greatly exaggerated. In experiments they breed together with maggots of *Lucilia* and *Calliphora* as long as the carrion is not advanced in decay, but a stage is reached when decay develops beyond that in which *Lucilia* and *Calliphora* are able to breed successfully and their maggots become weakened in consequence; this is the time when *Chrysomyia* maggots are liable to show their predacious powers. In a still further advanced state of decay *Ophyra* maggots thrive and, in their turn, prey on larvae that become weakened by disease. This simple series of progressive phenomena gives a better understanding of the relationship between the state of decay of carrion and the type of maggot fauna than has yet been published. Although *Chrysomyia* has been repeatedly reared on quite fresh carrion, the adults never seem to be drawn to it for oviposition under natural conditions, but will deposit on highly putrid carrion, whether other maggots be there or not. This has been shown by experiments in Brisbane.

*Chrysomyia micropogon* Bigot.

*Somomyia micropogon* Bigot 1888, 601.—Johnston and Hardy 1923, 33. (*Chrysomyia*).—Patton 1925, 406.—Bezzi 1927, 235.—Malloch 1927, 328.—Fuller 1932, 83 (larva).

*Chrysomyia megacephala* Bezzi 1927, 235.—Evidently referring to a form with large eye facets found in more northern parts of Australia and not certainly conspecific with the present species.

This fly does not seem to oviposit on sheep very often, but reports of its virulent nature suggest that the animal dies within two days of discovery. The reports need confirmation.

The sequence of attack on carrion is uncertain, but apparently the species oviposits earlier than *C. rufifacies*, but not as early as *Lucilia* and *Calliphora*. The smooth skinned larvae, when in a mass, appear to shiver, and can be easily detected at sight; they are not predacious.

*Chrysomyia varipes* Macquart.

*Lucilia varipes* Macquart 1849, 249.—Johnston and Hardy 1923, 33. (*Chrysomyia*).—Patton 1925, 410 (♀).—Bezzi 1927, 236. (*Microcalliphora*).—Malloch 1927, 326.—Fuller 1932, 86 (larvae).

*Chrysomyia annulipes* Patton 1925, 410 (♂).

A well-known small carrion fly in sheep country, with a tuberculated larva. The fly oviposits on carrion in a very advanced stage of decay.

*Chrysomyia flavifrons* Aldrich.

*Microcalliphora flavifrons* Aldrich 1925, 20 (♂).—Bezzi 1927, 236.—Malloch 1927, 326.

*Chrysomyia fulvipes* Patton 1925, 410 (♀).

Two females of the Illingworth material are before me.

*Chrysomyia latifrons* Malloch.

*Eucompsomyia latifrons* Malloch 1927, 326.

Two specimens come from the dense rain-forest of a gully near Mount Nebo road, Brisbane (part of the waterworks catchment area), so the species appears to be a rain-forest species of New South Wales and southern Queensland. The description is not very satisfactory and was based on a single male specimen, but it proves to be a valid species of *Chrysomyia*.

Subfamily CALLIPHORINAE.

*Aphyssura* new genus.

From a Western Australian specimen Malloch described characters conforming with the present genus and placed it in *Melinda*.\* Also he gave it the name of a species which he previously described from New South Wales, *M. minuta* Mall. 1936. He omitted to give the characters in his first description that would indicate the genus. Evidently more than one species occurs, and my specimens are from Tasmania. I select for the genotype the Western Australian species, the only one adequately described for generic recognition.

The leading feature of this genus is the uncleft fifth sternite of the male, but otherwise the genus seems to be allied to *Pollenia*. This sternite has a spur-like process subapically placed and all the known specimens are small.

Type.—*Melinda minuta* Malloch. Western Australia.

\* *Melinda* is part of the *Onesia* group of the genus *Calliphora*, differing by the absence of hairs on the squama, a character liable to occur on Australian *Onesia* species, and hence more applicable there than to *Aphyssura*, which is a genus more primitive than both *Calliphora* and *Pollenia*.

Genus *Pollenia* Desv.Key to species of *Pollenia*.

- |   |                          |
|---|--------------------------|
| 1. Light-coloured forms with fessellated abdomen; eyes of male separated by about the width of the ocellar tubercle. With very broad and elongated accessory plates and the aedeagus conspicuously elongate at apex .. .. . | <i>findersi</i> Hardy    |
| Dark forms with shorter aedeagus on all species examined  | 2                        |
| 2. Eyes on male separated by about the width of ocellar tubercle (N. S. Wales) .. .. .  | <i>sp.</i>               |
| Eyes on male separated by the width of two ocelli or less   | 3                        |
| 3. Male with hairs on the face entirely light yellow. Eyes separated by the width of one ocellus. Terminalia not examined .. .. .   | <i>tasmanensis</i> Macq. |
| Hairs on face of the male dark at least on the upper half   | 4                        |
| 4. Eyes separated by the width of two ocelli. Accessory plate of medium width (Brisbane) .. .. .  | <i>sp.</i>               |
| Eyes separated by the width of one ocellus .. .. .  | 5                        |
| 5. Accessory plate broad. Normally with one median bristle on the posterior side of the anterior tibiae .. .. .   | <i>calamisessa</i> Hardy |
| Accessory plate of medium width. Normally with two median bristles on posterior side of anterior tibiae   | <i>mortonensis</i> Macq. |
| Accessory plate very narrow. Frons of male with abundant unusually long hairs .. .. .   | <i>hirticeps</i> Malloch |

*Pollenia tasmanensis* Macquart.

*P. tasmanensis* Macq. 1849, 254.—Hardy 1926, 173.

*P. stolida* Malloch 1936, 21 (Sydney specimens only).

This synonymy is new. Macquart's record from Tasmania is evidently an error; it is only known to me from the Sydney district.

*Pollenia calamisessa* Hardy.

*P. calamisessa* Hardy 1932, 340.

*P. stolida* Malloch 1936, 21.—Typical form only.

The synonymy is new. Malloch's characters given for his typical form come well within variations of this widely dispersed species. It occurs from Victoria (F. Erasmus Wilson collection) to Queensland.

*Pollenia mortonensis* Macquart.

*P. mortonensis* Macquart 1854, 116.

*P. nigrita* Malloch 1936, 22.

From Tasmania to Queensland comes a species common in the southern areas, less plentiful around Brisbane, rather small, being from 5 to 7 mm. long, and to which the above synonymy is applicable.

*Pollenia hirticeps* Malloch.

*P. hirticeps* Mall. 1927, 318; and 1936, 21.

This is the common species of the Blue Mountains, New South Wales; from Adelaide comes an ally (unnamed) which has the normal short hairs on the frons.

Genus *Calliphora* Desvoidy.

Key to subgenera.

- |  |                    |
|--|--------------------|
| 1. Eyes hairy. Abdomen entirely ochraceous yellow .. ..  | <i>Adichosia</i>   |
| Eyes bare .. .. .  | 2                  |
| 2. Abdomen tessellated, being densely covered with a golden-brown pulverulent overlay .. .. .  | <i>Neopollenia</i> |
| Abdomen otherwise coloured .. .. .   | 3                  |
| 3. Abdomen yellow, with a metallic blue-green median stripe  | <i>Proekon</i>     |
| Abdomen entirely blue-green or almost so .. .. .   | 4                  |
| 4. Aedeagus with the struts free. Squama black-brown with a white edge .. .. .   | <i>Calliphora</i>  |
| Aedeagus with the struts fused with membrane to central tube throughout their length. Squama white, yellow, or dark, but never white-edged .. .. . | <i>Onesia</i>      |

Key to species of subgenus *Onesia*.

- |  |                           |
|--|---------------------------|
| 1. Large to average size, with forceps and accessory plates equally slender .. .. .  | 2                         |
| Accessory plates conspicuously broader than forceps, or if not then small species with a white pulverulent covering, and placed in couplet 9 below .. .. .   | 4                         |
| 2. Eyes of male separated by the width of the ocellar tubercle   | <i>robusta</i> Malloch    |
| Eyes of the male much narrower .. .. .   | 3                         |
| 3. Eyes of the male separated by the width of two ocelli ..  | <i>ruficornis</i> Walker  |
| Eyes of the male separated by the width of one ocellus ..  | <i>pubescens</i> Macquart |
| 4. With lateral flanges developed to lie one beside each accessory plate, on one species triangular in shape, on the other twice as long as broad. Eyes separated by the width of the ocellar tubercle .. .. . | <i>spp.</i>               |
| Without such flanges .. .. .   | 5                         |
| 5. Accessory plates more than twice the width of the forceps, which are undulating in outline. Eyes separated by the width of two ocelli .. .. .   | ? <i>clarki</i> Malloch   |
| Accessory plates normal, about twice or less the width of the forceps, which are not undulating in outline ..  | 6                         |
| 6. Struts of aedeagus fused together for practically their entire length, a character taken from figure, and not seen .. .. .  | <i>xanthocera</i> Malloch |
| Struts of the aedeagus fused for half their length .. ..   | 7                         |
| 7. Accessory plates ending abruptly, more or less expanding at apex. Eyes separated by the width of ocellar tubercle. Abdomen blue-green or blue .. .. .   | <i>clausa</i> Macquart    |
| Accessory plates tapering at apex, not expanding apically  | 8                         |
| 8. Fourth tergite on both sexes with a dense pulverulent overlay hiding the ground colour. Eyes separated by the width of two ocelli .. .. .   | <i>dispar</i> Macquart    |
| Fourth tergite not so covered .. .. .  | 9                         |
| 9. Abdomen black-green, heavily covered with a whitish pulverulent overlay, through which the ground colour shows. Eyes separated by the width of two ocelli ..  | <i>minor</i> Malloch      |
| Abdomen blue-green, very lightly covered with a pulverulent overlay. Eyes separated by the width of one to two ocelli .. .. .  | <i>assimilis</i> Malloch  |

*Calliphora dispar* Macquart.

*C. dispar* Macquart 1846, 195.—Brauer 1899, 524. (*Somomyia*).—nec. Patton and others.

*C. apicalis* Malloch 1927, 312.—

The synonymy is new; both authors mention the pulverulent covering on the apical tergite, which marks the species. My specimens are from Tasmania, but is recorded from New South Wales.

*Calliphora pubescens* Macquart.

*C. pubescens* Macquart 1849, 242.—Johnston and Hardy 1922, 192 (in part).

*C. dispar* Patton 1925, 399.—Hardy 1926, 173.—Bezzi 1927, 243.—nec. Macquart, nec. Malloch.

?*C. australica* Malloch 1927, 314.

?*C. cyanescens* Loew.—Brauer and Bergenstamm 1891, 420.—Apparently a manuscript name only and may belong here, as the species seems to be represented in every collection.

The synonymy is new; in addition, this species is responsible for the record of *C. erythrocephala* from Brisbane, as the late E. W. Ferguson misnamed one in the Johnston and Tiegs collection. It is quite common in New South Wales and Queensland.

*Calliphora robusta* Malloch.

*C. robusta* Malloch 1927, 313.

From New South Wales and Queensland, but rare in the latter State.

*Calliphora ruficornis* Walker.

*Musca ruficornis* Walker 1857, 215.

*Calliphora* sp. Hardy 1926, 173.

*Calliphora metallica* Malloch 1927, 317.

The synonymy is new. I believe I am correct in placing here the name given by Malloch, although I have not seen the species from New South Wales. It is a common Tasmanian form which extends at least into Victoria.

*Calliphora assimilis* Malloch.

*C. pubescens* Johnston and Hardy 1922, 192 (in part).

*C. assimilis* Malloch 1927, 317.

*C. dispar* Malloch 1927, 312—nec. Macquart, nec. Patton.

The synonymy is new. Large specimens and the typical smaller ones show a wide distribution over Queensland; see note under *C. minor*.

*Calliphora minor* Malloch.

*C. clausa* Bezzi 1927, 245—nec. Macquart.

*C. minor* Malloch 1927, 314.

The synonymy is new. In addition, the drawings of terminalia given for *C. plebeia* Malloch suggest the same species, but is said to have enlarged eye-facets and the frons very narrow.

In Brisbane there are three small species commonly found frequenting the ground together. *C. minor* is heavily powdered on a black-green abdomen, and the aedeagus is relatively small. *C. assimilis*, larger in

average size, has the pulverulent covering less dense on a blue-green abdomen, and the aedeagus is relatively longer. *C. clausa* has a bluish abdomen with hardly any covering, which marks its identity under field conditions. Queensland; widely distributed.

*Calliphora clausa* Macquart.

*C. clausa* Macquart 1848, 55.—Brauer 1899, 524.—Hardy 1926, 172—nec. Bezzi.

*C. pusilla* Macquart 1854, 130.—Brauer 1899, 524.

*C. sp.* Malloch 1927, 311.

*C. accepta* Malloch 1927, 316.—Fuller 1933, 325 (life history).

The synonymy is new. The closed and nearly closed fifth radial cell is not an uncommon feature of this species, and I have one male and a series of females from various States with the character. Bezzi records *clausa* from North Queensland, but the record evidently refers to *C. minor*, which also sometimes has the cell almost closed. Specimens are from Tasmania, South Australia, Victoria, New South Wales, and Queensland.

*Calliphora clarki* Malloch.

*C. clarki* Malloch 1927, 316.

I may be wrong in the identification of this species, the description of which agrees with a Queensland species before me and upon which I have based the characters given in the key; the type locality is Western Australia.

*Calliphora xanthocera* Malloch.

*C. xanthocera* Malloch 1927, 313.

If the struts of this species be correctly drawn, they must be fused along the median line to a greater extent than normal. I have not seen this character which is used in the key, but specimens from Donna Buang, a mountain near Melbourne, may be identical; the male lacks the aedeagus and cannot be identified with certainty. The type locality is Kosciusko.

Genus *Lucilia* Desvoidy.

Key to species of *Lucilia*.

- |   |                             |
|---|-----------------------------|
| 1. With upstanding hairs above metathoracic spiracle; dorso-central bristles arranged 2:3 ( <i>Hemipyrellia</i> ) ..  | 2                           |
| Without upstanding hairs above metathoracic spiracle; dorso-central bristles arranged 3:3 .. .. .   | 3                           |
| 2. Face with a golden pulverulent covering. Thorax and abdomen partly yellow-orange. Lateral lobes (bordering genital cavity anteriorly to accessory plates) well developed and hairy .. .. .   | <i>fergusoni</i> Patton     |
| Face with a silvery pulverulent covering. Thorax and abdomen without yellow-orange colouring. Lateral lobes restricted and very sparsely haired. Male with eyes conspicuously separated .. .. . | <i>ligurriens</i> Wiedemann |
| 3. Subcostal sclerite with one or more upstanding bristles. Eyes on male closely approximate ( <i>Lucilia</i> ) .. .. .   | 4                           |
| Subcostal sclerite with only decumbent pubescence ( <i>Phenicia</i> ) .. .. .   | 5                           |

4. Anterior pair of postsutural acrostichals more advanced than second pair of postsutural dorsocentrals. Antennae orange . . . . . *flavicornis* Malloch
- Anterior pair of postsutural acrostichals level with or slightly posterior to second pair of postsutural dorsocentrals. Female with two antero-dorsal bristles on middle tibiae . . . . . *papuensis* Macquart
5. Abdominal sternites of male with outstanding long hairs. Anterior femora normally with its colour metallic green . . . . . *cuprina* Wiedemann
- Abdominal sternites of male less tufted in appearance, so that the hairs appear uniformly short. Anterior femora normally steel-blue in colour . . . . . *sericata* Meigen

## DISTRIBUTION OF SPECIES OF LUCILIA.

*L. cuprina* Wied. 1830 (*Musca*) was described from China, but is supposed to be originally African, and has spread throughout the tropics.

*L. sericata* Meigen appears to be European and Asiatic and has spread throughout the more temperate areas. In Australia the distribution overlaps so that, as in Brisbane, wherever difficulty in distinguishing females on the accepted characters is evident, there is reason to suppose that a certain amount of interbreeding takes place. This would account for many unsatisfactory identifications in collections.

*L. flavicornis* Malloch 1927, is at present only known from Queensland and was reduced by Aubertin to a local variety of *L. porphyrina* Walker 1857, known from India, Japan, and Java.

*L. papuensis* Macquart 1843, is, I think, *L. tasmanensis* in Froggatt's Farmer's Bull. No. 95, 1915, p. 26 nec. Macquart. It is known from Queensland and New South Wales.

*L. ligurriens* Wiedemann 1830, is abundant in North Queensland, but also occurs in the South. Desvoidy's description of *L. germanica* reads like the same species, the locality given being "Nouvelle Hollande et de l'Isle de France." The latter is part of France, and so the species might be a *Phormia* as was suggested by Aubertin 1933. Nevertheless, Walker's identification from Adelaide can hardly be correct and possibly was based on *Chrysomya rufifacies* Macq.

*L. fergusonii* Patton 1925, is common in the dense shore scrub and spreads to the open forest in the spring. It was reared by me from a pupa collected under a dead bird in the bush at Sunnybank several years ago. South Queensland and New South Wales.

Genus *Sarcophaga* Meigen.

The species in this genus form three main groups already dealt with in prior papers. The following notes bring the available information to date.

Evidently *S. omikron* J. and T. is mainly inhabiting the sheep country in all mainland States:

*S. synia* J. and T. has two allies, one found on the seashore, near Brisbane, the other reared from the Cossid moth pupa *Xyleutes* at the roots of *Bassia quinquecupis* (the roly-poly) from Boggabilla, New South Wales, and on another occasion from Dirranbandi, Queensland. All three species belong to the *S. crinata*-group, which is limited to the Oriental and Australian regions.

It is still uncertain if *S. omega* J. and T. is conspecific with *S. knabi* Parker. The latter is an island species of the northern hemisphere, the former mainly inhabits the more arid sheep country of Queensland and New South Wales, but extending to Western and South Australia. There is no evidence yet to show a continuity in distribution as it appears to be absent from the equatorial belt and is rare in the coastal regions of Queensland. On the other hand, I am unable to find anything like a valid structural difference between the two.

*S. gamma* J. and T. proves to be *S. orchidea* Bott. as claimed by several authors, and its distribution includes the equatorial zone; some specimens are from the island of Manus.

*Sarcophaga bancrofti* J. and T.

*S. bancrofti* J. and T. 1921.—*S. fergusoni* J. and T. 1922, nec. Hardy 1936.

I have examined the Johnston and Tiegs types of both these, and have concluded they are conspecific. My identification of the latter in 1936 was based on a unnamed species. That new species was in the Johnston and Tiegs collection but left unnamed by them, and all the named specimens are *S. bancrofti*. Again, the subgeneric position may prove doubtful, and it may yet be moved from subgenus *Sarcophaga* and placed in *Parasarcophaga* as a decadent type. The female, now known, conforms with the predicted characters already given in key form by me (1936). The female allotype is from near Goondiwindi.

*S. fergusonina* n.sp.

*S. ?fergusoni* Hardy 1936, 95, nec. J. and T. 1922.

As my provisional identification of *S. fergusoni* has proved incorrect and the name sinks to synonymy, it is necessary now to erect a new name for the species I had then before me, and had based on two males from Goondiwindi, Queensland. A third specimen is in the Johnston and Tiegs collection, but poor in condition.

*Helicobia australis* J. and T.

In accordance with the classification by Rhodendorf (1937), this species should be referable to genus *Pierretia* Desvoidy 1863.

Tonnoir (1938) maintains *Helicobia* is a reasonable position for the species "in spite of discrepancies," but the relationships are bound up primarily with the Palaearctic fauna, not with that of North America to which *Helicobia* belongs; therefore several other names take precedence, reducing *Helicobia* to a synonym.

Tonnoir regards the lateral processes of the sheath as being part of the filaments, and hence he makes erroneous drawings of the aedeagus. The allotype female in the Australian Museum, Sydney, was overlooked by him, for he erected a second allotype.

## REFERENCES.

The often quoted standard works of Bigot, Brauer, Brauer and Bergenstamm, Desvoidy, Macquart, Schiner, Walker and Wiedemann are well known and need not be listed here; references to the other papers are as follows:—

## ALDRICH—

1925. Proc. U.S. Nat. Mus., lxvi., 16-21.  
1926. *Ibidem.*, lxix., 7-10.

## AUBERTIN—

1931. Proc. Zool. Soc. London, 497-509.  
1933. Journ. Zool. Soc. London, xxxviii., 389-436.

BEZZI.—1927. Bull. Ent. Res. London, xvii., 234.

BERGROTH—1894. Stett. Ent. Zeit., 74.

FROGGATT—1918. Proc. Lin. Soc. N.S. Wales, xliii., 658-667.

## FULLER—

1932. Proc. Lin. Soc. N.S. Wales, lvii., 77-91.  
1933. Parasitology, xxv., 352.

## HARDY—

1926. Proc. Roy. Soc. Queensland, xxxvii., 173.  
1932. Proc. Lin. Soc. N.S. Wales, lvii., 338-340.  
1934. Proc. Roy. Soc. Queensland, xlv., 30-1.  
1936. Proc. Lin. Soc. N.S. Wales, lix., 95.

## JOHNSTON AND HARDY—

1922. Proc. Roy. Soc. Queensland, xxxiv., 191-4.  
1923. *Ibidem.*, xxxv., 33.

## JOHNSTON AND TIEGS—

1921. Proc. Roy. Soc. Queensland, xxxiii., 50 and 85.  
1922. Rec. Austr. Mus., xiii., 175-188.

## MALLOCH—

1926. Ann. Mag. Nat. Hist. (9), xviii., 496-510.  
1927. Proc. Lin. Soc. N.S. Wales, lii., 297-335.  
1928. *Ibidem.*, liii., 612 and 328.  
1929. *Ibidem.*, liv., 283.  
1936. *Ibidem.*, lxi., 21-23.

PATTON—1925. Philippine J. Sci., xxvii., 337-411.

RHODENDORF—1937. Inst. Zool. l'Acad. Sci. de l'Urss (n.s. 12), xix., 500 pp.

## SENIOR-WHITE—

1924. Spolia Zeylanica, xiii., 109-117.  
1925. Rec. Indian Mus., xxvii., 81-95.

SURCOUF—1914. Nouv. Arch. Mus. Hist. Nat. Paris (5), 48, 58-60.

TONNOIR—1938. Proc. Lin. Soc. N.S. Wales, lxiii., 129-132.

## TOWNSEND—

1916. Proc. U.S. Nat. Mus., xlix., 1916, 618.  
1917. Rec. Indian Mus., xiii., 185-202.

V.D. WULP.—1880. Tijds. v. Ent., xxxiii., 174.